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THE SPECIFICATION OF FILM-ATTRIBUTES FOR PSYCHOLOGICAL AND EDUCATIONAL RESEARCH PURPOSES. RESEARCH MEMORANDUM.

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The definition of film attributes must bridge the gap between technical descriptions of the attributes (e.g., the arrangement of the visual material) and expected psychological effects of the attributes. Interaction effects between learner traits, learning objectives, and a film's attributes should be expected, since each attribute contributes to a different aspect of the film's message, thus creating an effect unique to that particular film. Attributes should be specified first in technical, or "structural," terms and then in functional terms. Functional terms limit the number of attributes to those expected to have psychological effects on the viewer and specify the task to be performed in response tothe film. There are two approaches to functional descriptions, one through information theory and one through psycholinguistics, and both are supported by research. However, the psycholinguistic approach assumes that different films share a commo language structure. This approach is logical in nature nd deals with the kinds of informat on presented, whereas the information theory approach is empirical in nature and deals mainly with the quantity of informat on presented. (LH)

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The Specification of Film-attributes for Psychological and Educational Research Purposes

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Introduction

The purpose of the present paper is to clarify constructs that can be used in studying the psychological effects of instructional media attributes. It is intended to discuss ways by means of which media attributes can be specified in terms that suggest appropriate forms of psychological and educational research. The basic assumptions underlying the proposed methodology are as follows: (a) one should expect interaction effects between particular media attributes, learner traits, and learning objectives, rather than main effects due to media attributes alone; (b) the media attributes under investigation should be explicated in terms which lend themselves to psychological research. They must serve as a bridge between the technical or structural descriptions of the attributes and their expected psychological effects or correlates. It is reasonable to view these assumptions as related, the former being an objective of research and the latter its vehicle.

The search for interactions between aptitudes and training procedures has not yet been systematically pursued on a large scale, although Cronbach, as far back as 1957, pointed to the need for such an approach. The applications of such an approach to the study of media-effects can also be stated in terms of assumptions, as follows: (1) "In film presentation (or any other medium of communication) where critical information is presented via channels or channel interactions which are not unique to motion pictures, there is little reason to expect unique cognitive effects as a result of using film. The reverse might also be hypothesized: where critical information is presented via features which are unique to motion pictures, unique cognitive effects may be expected." (Pryluck & Snow 1967, p. 64). (2) The unique attributes of the medium under investigation will have unique psychological effect only if they arouse in the viewer mediating mental processes which are relevant to the particular learning task at hand. In other words, a unique effect can be expected to result only when the use of unique medium attributes supplant in the learner mental processes which are required for the production of a particular learning outcome. Some of Hovland's experi-

ments (Hovland, Lumsdaine and Sheffield, 1949) indicate clearly that whenever no significant differences obtained between film and film-strip presentations, the two seemed not to call for different mental processes relevant to the learning task. On the other hand, Festinger and Maccoby (1964) showed a differential effect of sound-picture combinations on attitude changes, presumably because each of the presentations (distracting vs. direct communication) produced . . states which were directly relevant to weakening defenses against persuasive communication. (3) The effect of a particular media attribute depends in part upon the conceptual structure, attitudes, abilities, cultural background, etc., of the learner, e.g., where certain culture-dependent assumptions are implied in a medium, one effect will be on students of that culture and another on students who do not share these implicit assumptions (Salomon, 1968). Consequently, what might be a unique and relevant medium attribute for one person could be irrelevant for another who differs from the first in his predispositions, abilities, etc. Here, the search for aptitude interactions, instead of main effects, and the search for the unique and relevant media attributes come together.

However, to study interactions of relevant media attributes with learner characteristics or learning tasks, one must know something of the nature of each factor. We wish to know not only that an attribute of some TV presentation facilitated learning in students of a certain type, a finding which might only be explained in post hoc fashion, but also we wish to be able to predict that the generalized use of that mode of presentation will result in given outcomes for students of that type. In other words, we need a theory that predicts and explains interactions between characteristics of learners and attributes of communication media. This requires detailed structural and functional descriptions of each.

Learner characteristics cannot be treated here. The present discussion must be devoted to problems involved in specifying the nature of media attributes, with particular reference to film. There have been previous attempts to explicate the unique attributes of the film medium (cf. Spottiswood, 1965, Kracauer 1960, Panofsky 1966, and others), but most of these have been restricted to the semantics or the syntactics of the medium, hardly discussing systematically its pragmatics. A recent attempt by Pryluck (1967) yielded an interesting discussion of the film symbolic structure, but only introduced

the question of its potential effect on the viewer. The explication we aim at, beyond those mentioned above, should bridge the gap between structural descriptions of the medium and the psychological processes it might arouse. Thus, it is what Lumsdaine (1963) referred to as the need to define factors under experimentation "in terms of theoretically oriented variables, and not solely in terms of gross physical characteristics of instructional media" (p. 601).

Is the Medium the Message, All the Message and Nothing but the Message?

Without defining for the moment what attributes of a medium are, one could agree that, say, movement, or the recording of reality, are essential aspects of photographic film. What do such attributes do to the message? They are not, certainly, the message itself. They provide a framework, a set of rules for the particular messages. That is to say: An attribute of the medium imposes some restrictions on the kinds of stimuli which can be presented but meanwhile gives the opportunity to convey some new kinds of stimuli. Three examples will suffice. One cannot record visual reality by means of written scripts without changing modalities. On the other hand, the script enables one to convey ideas, concepts and symbols which have no referent in the real physical surroundings, something which cannot, in general, be done by film. In a map, one cannot present things which do not lend themselves to symbolization, but one can present many things simultaneously. The film does not lend itself to presenting generalized concepts, (how does one show "nevertheless"?) but allows the presentation of many particular real-life instances which one could not experience otherwise (Kracauer, 1960). Thus, the message is controlled by the attributes but not determined by them.

A film is not necessarily "cool" or "hot". Its "coolness" or "hotness" is determined by the interaction of attributes and messages. Moreover, the film medium has many different attributes, some due to the physics of photography, others the result of technical "tricks" or editing styles. The combination of such attributes creates new ones, since the interactions can become complex and subtle. As a result, two films may be structurally quite different and yet share common basic attributes. It follows that we can analyze single attributes and their interactions with the kinds of communication stimuli they allow, but we can hardly generalize over the whole medium.

Some rather basic and simple generalizations are, of course, possible and needed. But to state that the whole medium is this or that*, regardless of the unique interactions of attributes in each particular case, is unwarranted.

To summarize the discussion, it seems possible to say that each attribute of the film is a rule controlling the message. New attributes stemming from the interaction of more basic attributes impose new rules and make each film potentially unique. Finally, it seems reasonable to study the effects of single attributes or combinations of attributes, but it is unreasonable to speak of the medium as a whole in this respect.

As now evident, the medium is viewed here as the set of all attributes which compose it. Movement, reality of presentation (not necessarily the idea behind presentation), "multi-channeiness", etc., all belong to film and all when taken together compose the medium. If the medium is the sum-total of its attributes, no wonder critics recommend that particular productions of the medium must remain true to its set of rules or components. Without this restriction the production becomes a mixture of media, a bad outcome from their point of view. Notice, however, that it follows from this line of thought that the set of rules, i.e. the attributes, can be arranged in diverse ways, each way potentially affecting the message differently. Thus, the medium as the sum of its attributes cannot be equated with the message.

Let us agree for a moment with Kracauer's notion that "films are true to the extent that they penetrate the world before our eyes". Let us extend it also to the world before our ears. When the two are congruent, the message conveyed is nicely equated with the medium, as the sum total of the two attributes (visual reality and aural reality). Now imagine that the two are incongruent with each other (as in Festinger & Maccoby, 1964). It is no longer the same message, and the new message cannot be equated with the medium. Also, audio visual incongruity becomes a higher-order attribute of this

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*See for instance the claim of Panofsky, quoted by Kracauer (1960, p. 309) that ". . . it is the movies, and only the movies, that do justice to that materialistic interpretation of the universe. . ." (Thus it is the only medium operating from material to idea, rather than vice versa).

film but it remains a potentiality of the medium, not a necessary component.

From the question of relations between attribute, message and medium, it seems necessary to move toward some specification of "attribute" as the key concept. Theoretically, the number of possible attributes which compose a medium may be unlimited. However, to deal intelligently with a complex medium like film it is necessary to restrict the list. According to what criterion can the limits be imposed? It happens, interestingly, that art critics, film analysts and psychologists who are interested in media effects, agree on one basic point. It is the assumption that the important attributes of a medium for specifying, analyzing, evaluating, or studying are those attributes which are unique to the medium under discussion (Cf. Spottiswoode 1964, Pryluck and Snow 1967). We can expand this point and assume that the uniqueness of a medium is the sum total of its unique attributes, though the medium itself is composed of more than its unique components. No other medium (besides real life) can show movement without space restrictions, changes in modalities, or fragmentation. Hence, the attributes we should deal with in the present context are those existing only in the film medium or in its base, photography. It should be added, however, that attributes which result from the interaction of non-unique attributes might be unique to the film. Now, after restricting the list of possible attributes we must specify what an "attribute" is.

It seems that a reasonable initial specification would be as follows: Any structural component which has an influence on the kind of material one can present, the arrangement of the material with relation to other material, or the way the material is presented is an attribute of the medium. The fact that photographic film can show only objects which reflect light naturally influences the kind of material. The fact that each picture, inevitably shows more than is immediately needed influences the arrangement of the material in terms of foreground and background. The time-condensing element influences the way things are presented in sequence. A list of attributes of film constructed on the basis of such a tentative definition needs, however, some special treatment. We are not interested in what defines the medium of communication called film, for the sake of studying film. What we are interested in are those attributes which under certain arrangements, and when used to convey certain ideas to a particular audience, evoke the desired psychological processes.

Our need is to generate a list of stimulus variables with definitions based in the physical nature of film. From such a list we can then choose attributes of potential significance in psychological research. Since single attributes always appear in some context and since such attributes may themselves be considered as combinations of more elemental variables, it will be necessary to gain some multivariate conception and control of the complex stimulus aggregate. The problem is not unlike that faced by the differential psychologist interested in analyzing the nature of general intelligence as some organization of more specific human abilities. From observable item and test performances, clusters are formed to represent psychological traits. The attributes are in turn combined to represent higher-order constructs. Whether dealing with tests, traits, or higher constructs, the psychologist wishes to generalize to populations of persons and so samples large numbers of people for his intercorrelational work. Similarly, the film analyst may at present be faced with the need to consider samples from populations of films and correlational analyses of stimulus elements measured in these samples (an earlier example of this approach was provided by Snow, 1963). Unless it is known what stimulus elements vary together across films to form some attribute, the effects of context on a particular attribute may not be estimated. The need is for representative sampling and analysis of film "ecology" of the sort proposed by Brunswik (1956). The communicative structure of film might then be understood in terms of a hierarchy of attributes formed from the stimulus texture through covariation among elements and classified according to several broad categories.

The Sub-set of Functional Attributes

Until now we have discussed the question of film attributes and their specification from a structural point of view. This seems to be a necessary preliminary step. However, not every unique attribute used in a film necessarily functions as a stimulus for the arousal of unique mental processes. Certain attributes, or combinations of them, may not function as stimuli for desired processes, or often evoke processes which are irrelevant to the desired learning outcome. We might speak therefore from a functional, rather than a structural point of view and claim that for our purposes unique attributes of the film are those structural components which produce the desired mental effects. In light of such a functional approach (which will certainly

not satisfy somebody outside psychology) the medium is differently perceived. The medium becomes, now, the sum-total of all its unique effects on the viewer. Structural features, the addition of which does not affect the viewer, become irrelevant for psychological or educational research, and thus remain as "constants", rather than as influential variables. Pryluck & Snow (1967) state in this respect that ". . . the structural characteristics of motion pictures are significant to the extent that they uniquely constrain or facilitate cognitive processes relative to the information presented" (p. 65). In a functional approach another factor has been added, namely, the task to be performed in response to the presented film. What may be an attribute arousing unique cognitive (and/or affective) effects under one set of task conditions may be irrelevant under another set. The conclusion follows that there are two lists of film attributes: one is the list of structural attributes, and the other, a sub-set of the former, is a functional list which contains only those attributes having unique psychological effect on the viewer. Since the latter depends on the kind of task to be performed, it is a flexible list that changes along with changes in the task.

Tasks are here defined as the purposes or uses assigned to a film, whether instructional, commercial, or documentary. It should be noted that one film can serve many purposes. A commercial film may serve also as an illustration of social interaction for psychology students; a film designed to teach Biology students about the social life of bees may serve as entertainment for non-biologists. The original function of a film (e.g., to present the relation between a man and a woman in a crowded town) magnifies certain structural attributes of the medium with the hope that they will be functional, that is, that they will arouse the mental processes the producer seeks. Using the same film for a different purpose (e.g., to show the relation between street and home life in a town) may leave some attributes without function and make others functional. Thus, each structural attribute has the potential of becoming functional, nonfunctional, and perhaps also dysfunctional.

Thus, the discussion shifts from the unique attributes of a medium to the unique communication experience it might provide. The former deals with the set of rules governing the structure of a medium (see, for example, Pryluck, 1967). The latter refers to the sub-set of attributes functioning as a source for unique experience.

The Link Between Structural Attributes and Their Functional Potentialities

To study the effect of media variables on mental processes, two steps must be taken: the first is to determine how one attribute or a combination of variables affect mental processes; the second is to determine why it affects as it does. There are many studies showing that certain variables have certain psychological effects. However, one rarely knows why such effects occur. Studies of this kind can be found in various summaries; all too often there is no adequate explanation for the empirical results (Cf. Allen, 1960, Lumsdaine, 1963; Barrow, 1958 and others).

One reason it is difficult to go beyond the how to the why is that the conceptual links between technical or structural descriptions of a film attribute and its expected psychological correlates are missing. Such links might be found in the description of an attribute itself, though it must be in terms other than structural or technical ones.

To claim that, say, more abstract knowledge has been reached by the viewer because he was exposed to "shifts in the angle of the camera" is to say nothing more than that A caused B (in the best case) or that A and B go together. Stating that the same attribute has the function of "showing the various aspects of one phenomenon" reveals more. Following Piaget's theory, being able to "visualize" the various facets of one phenomenon is an important step toward being able to operate symbolically. Thus, we can relate the film attribute "movement of camera", its function "to reveal other aspects of the phenomenon presented", and the effect "more abstract mental operations with the given material on the side of the viewer". Hence, we suggest why A leads to B. The link is the functional description of the attribute under discussion. It specifies the attribute in terms which lend themselves to psychological prediction. The question of what kind of approach or discipline can be used to "translate" structural attributes into functional terms is essentially identical to the older question regarding the specification of stimuli, in general, and of graphical material in particular. Many attempts to specify graphical presentation in other than technical terms have returned sooner or later to rely on viewers' responses. Attneave (1959), Berlyne (1960, 1965) and others have applied information-theory constructs and measures in attempting to specify the nature of stimuli. This resulted in the deduction of hypotheses as to expected psychological processes and effects.

Similar successful applications of information-theory have been accomplished by Driscoll, Tongoli & Lanzetta (1966), Sieber & Lanzetta (1966) and others.

The information-theory approach, however, is not necessarily the only plausible one. Another approach, suggested recently for the explication of film attributes, is psycholinguistics (Pryluck & Snow, 1967). We will try in the following pages to show how these two approaches--psycholinguistics and information-theory--can be used to specify the functional attributes of film for research purposes.

A psycholinguistic approach. The basic assumption of a psycholinguistic approach is that both verbal and non-verbal communication can be described in psycholinguistic terms. Within this discipline, one can further describe the kinds of information presented in a film, as in Ruesch and Kees's logical analysis of the film medium (1956). Using their division of film information into two classes of codification (digital and analogical) as a base, Pryluck & Snow analyzed each of these into further sub-divisions. Each sub-division represents one channel of communication, e.g. audio-verbal (the words on the sound track), video non-verbal (the visual aspect of the film excluding printed words and symbols) etc. Six channels are listed, each assumed to transmit independent information. However, the different channels are presumed to interact, resulting in new kinds of information. Not all the channels are unique to film. The audio-verbal channel, for instance (written scripts), is definitely not unique to film, nor is the audio-paraverbal channel (intonations, pitch, etc., associated with speech). Only one of the single channels, the video non-verbal, seems clearly unique to film, though combinations of nonunique channels may create unique potentialities. The unique attributes of the film medium can be reasonably seen as sub-divisions of the channels employed by the medium, e.g. "simultaneity of presentation" or "close-up" are components of the video non-verbal channel.

As noted above, an important premise for a psycholinguistic approach is that the material under discussion is a language having both vocabulary and grammar or analogues thereof. With respect to the video non-verbal channel of communication, however, it is not apparent that a "language" is necessarily involved. Whether the visual component of the film has a syntactic structure, and whether this structure governs the organization of

"words", is a long-standing question that cannot be asnwered here.* It can be agreed, however, that speaking of the grammar, syntax or words of a language implies the existence of conventions. This is obvious, as Chomsky (1966) discusses it, with regard to spoken languages. Is it obvious with regard to films?

One could argue that though there are "words" of film (to whose conventional meanings we gradually become accustomed, still there is no agreed-upon syntax. Further, it can be argued that violating the rules of syntax in verbal communication destroys the transmission of most-essential information, without which no social structure could exist. This seems not to be the case with film, where the violation of syntactic rules, if these exist at all, may often be desirable. A new syntax, invented by a producer, may even facilitate the transmission of information. In any case, the fact that each producer can impose his own structure on his communication (as in other arts) corresponds to the assumption that the film does not transmit essential information. When, however, the information becomes crucial (as is the assumption in many military informational films) then the producer must use the simplest, most conventional structure or syntax. In this case a psycholinguistic analysis is clearly possible. In Rene's films on the other hand as well as in Bergman's, one must adopt the producer's idiosyncratic syntax and analyze the components of the film from that standpoint. In the latter cases, no syntactic analysis of the film may be possible.

However, this is a relatively rigid conception of psycholinguistics and of film. The counter-argument would run as follows: the information conveyed by films is expected to reach the viewer; thus the producer must rely to some extent on the viewer's associations and expectations, as best as he can predict them. Underlying the different styles and "grammars" is a deeper layer of conventions with regard to visual symbols, sequence of presentation and general structure. The more comprehensible the information, the more complex the syntax can be, but still it is a syntax. A producer can introduce variations in syntax, yet the baseline is common to him and to other producers. One should not forget that in verbal communication also some violations of syntactical structure are allowed; poetry is but one

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*An interesting and extensive discussion of this problem can be found in Pryluck (1967).

example. Even with poetry one can analyse the syntax of one poet, of one period of poetry or one kind of poetry. The fact that there are various "syntaxes" need not disturb the analyst. Thus, it is possible to specify the common grammatical and syntactical structure of the medium and the variations within it.

Whatever the stand one takes in this controversy, it seems quite reasonable to suggest that the film medium in general, as manifested by some sixty years of usage, yields a common core of grammar and syntax. Films usually have a theme, (whatever their specifically assigned function), they have sequences which intuitively (see Chomsky, 1966) make more or less sense, and they have certain attributes which contain particular shared semantic meaning (e.g. we no longer must be told that a cut represents a shift in time and/or space).

Since there are sequences of pictures the meaning of which (from the viewers' point of view) can be rather safely predicted, one can assume the existence of semantic clarity or ambiguity and also syntactic clarity or ambiguity. Furthermore, film has presumably a core or "kernel"*, as implied in the idea that recent films are actually elaborations of earlier film attributes. But the problem of identifying "words", "phrases", and "sentences" in films still remains with us. While it seems potentially possible to apply psycholinguistics to the analysis of the medium, the analyst must define clearly what he regards as the unit of analysis. Each structural attribute, when taken out of context, may not lend itself to such an analysis, but sequences of attributes may do so (e.g. a "massed" long shot is followed by a close-up, then by a "still" and "massed" long shot from a new angle). By means of logical method one can thus describe a film in terms which are closer to psychological implications than are technical or structural specifications. The important point is that a link is being created between the technical specification of a film and its possible effects.

A study by Festinger and Maccoby (1964) serves as an example. They report that a film constructed of two completely unrelated messages (a visually amusing display and a sound track which argues against fraternity life in colleges) resulted in significantly stronger changes in viewers'

* Chomsky: a kernel is the core of basic sentences in the language which can be subjected to transformation.

attitudes toward fraternities than did a "regular" film. The latter involved the same sound track as the former but its visual component illustrated the orally presented argument. In their theoretical discussion, they argue that "the critical variable would be the extent to which the attention of the person was distracted from the persuasive communication while listening to it" (p. 360). This statement takes a significant step toward explicating the nature of the experimental film in terms which lend themselves to psychological hypotheses. However, the reason <u>why</u> the viewers might be distracted remains unexplained. Suppose however that the lack of fit between the channels were described in psycholinguistic terms as "semantic incongruity". Previous research with such ambiguity has shown that (a) subjects usually try to "make sense" out of such situations, i.e. to "straighten out" the ambiguity (Vernon, 1966); (b) once subjects realize that there is something unexpected or incongruous in the field of view, they tend to devote more attention to it, rather than to other parts of the field (Berlyne, 1965); and (c) the part of the information which cannot be attended to immediately may nonetheless be placed in temporary storage for later treatment (Broadbent, 1966). Given these points, one may hypothesize that the "misfit" film in the Festinger & Maccoby study evokes these three mental processes while weakening the viewer's defense development. The distracting function of the film is realized when the viewer, instead of counterarguing and derogating points made by the commentator, tries to make sense of the semantically incongruent channels. The original theory of the authors is similar to that presented here, but it emphasizes only what the viewer is <u>not</u> doing, i.e., what the film is preventing the viewer from doing, rather than what it causes him to do.

<u>An information-theory approach</u>. Applications of information-theory constructs and methods have been accomplished with regard to complexity of stimuli (Clement, 1964 and Attneave, 1959), information-seeking behavior (Cf. Berlyne, 1960, 1965), response uncertainty (Cf. Garner, 1961, and Karlins, 1966), individual differences in pre-dicision behavior (Cf. Sieber & Lanzetta, 1964), etc. Our ability to measure the amount of information carried by a certain kind of presentation, or the amount of uncertainty contained in it,

is the key to the application of this theory. Here we do not necessarily specify kinds of information, as before, but only the amount of it to answer such questions as: how much information does the narration add to a sequence of pictures? How redundant is it? How much response uncertainty is aroused when frequent cuts are being employed?

In a study by Cooney & Allen (1964) it was found that a "non-linear" film (simultaneous presentation of stimuli) resulted in more conceptual learning than a "linear" version of the same film, and that the "linear" film resulted in higher factual learning than the "non-linear"one. This finding was obtained with sixth graders but not with eighth graders. The obtained results would be difficult to explain without post-hoc analysis. Had we known, however, in advance, that for a given task and students the "non-linear" presentation carried with it more information than necessary for the task, we could perhaps have predicted the outcome. The advantage of the proposed methodology lies in its attempt to relate "non-linearity" (a technical term describing film structure) and "factual learning" by translating the technical description into terms more conducive to psychological prediction.

One point must be kept in mind: the functional attributes of a film, as noted previously, are not generalizable across all kinds of films and situations. Thus, the amount of information added by a "long shot" for example, must be determined with reference to a particular function assigned to the film. A "long shot" may be redundant when the viewer must study details, but highly loaded with relevant information when he studies the relations between an object and its surroundings. In the former case the "long shot" introduces redundancy which may lead to boredom. If it adds irrelevant information (cues to which the viewer need not respond - Miller, 1957), then it increases "noise". "Noise" in this sense would lead to interference of stimuli. The behavior of the viewer will then be predicted accordingly. In the latter case, the opposite occurs: the "long shot" adds relevant information while a close-up may introduce noise.

It is evident that not every structural attribute of film can be specified as a single entity out of context, e.g., camera angles, kinds of shots, the physical-reality nature of the film, etc. One can speak of

larger or smaller information loads generally, however, with regard to long shots or close-ups, simultaneous or linear presentation, and some other attributes.

Expanding the information-theory approach somewhat, one can specify not only how much information (noise or redundancy) is contained, but also the kind of information involved given that the task of the viewer is known and analyzed. (The latter point has recently been discussed by VanDermeer, 1967.)

A study by Northop (1952) compared three versions of a film -- a "discrete item" film (no inherent organization), a "logical development" film and a "chronological" story-like film -- in terms of factual information gain. Each version was presented both with and without inserted explanatory titles. Results showed that learning of facts was better from the "discrete-item" film with insertions than without, but that the opposite was the case for the "logical" film, where learning was better for the non-insertion version. The "logical" version of the film apparently contained sufficient information for the learner when it was without inserted titles. The addition, however, may have introduced noise, or at least redundancy, which led in turn to conceptual response uncertainty.* For the discrete version initially higher uncertainty was reduced when titles (additional conceptual information) were inserted.

Jaspen (1950) varied the density of presentation (more or less shots in a given unit of time and longer or shorter presentation of each shot). He found that the less visually dense versions of the film produced superior factual learning. Had Jaspen measured the amount of visual information introduced in each version, he presumably would have found that the "more dense" version included more information. It would not have been unreasonable to predict that the former versions imposed more perceptual uncertainty on the viewer which interfered with attending behavior. Thus, two different kinds of uncertainty were seemingly involved in the two studies, the

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* Response uncertainty is defined as the arousal of incongruent competing responses to a single stimulus (Berlyne, 1960). Conceptual uncertainty refers to cognitive responses while perceptual uncertainty refers to a conflict between different cues one can attend to simultaneously.

understanding of which could lead to more penetrating predictions. The application of information-theory concepts to the specification of one film-attribute was attempted recently by Salomon (unpublished). The purpose of the experiment was to demonstrate an interaction between a film attribute and task-requirements. It was hypothesized, following the argument of the present paper, that the unique attributes under investigation would have unique psychological effect only if they aroused in the viewer mental processes relevant to the particular task to be performed. Two tasks and two versions of a film were utilized. The tasks were (1) to report as many details and facts from the film, and (2) to generate as many different hypotheses about the story-line of the film as possible. The two versions of the film were as follows: one version was "structured", i.e. presented in the logical-order imposed upon it by the original editor. The other version was "non-structured", i.e. the film was separated at its original cuts and re-sequenced at random. It was hypothesized that the non-structured version (NS) would produce higher conceptual response uncertainty and would facilitate hypothesis-generation, since it would presumably evoke task-relevant processes. The structured version, (S) on the other hand, was not expected to produce high response uncertainty, and would therefore facilitate less the performance of that task. However, with regard to a different task, i.e., cue-attendance, it was hypothesized that the opposite would be true. The S version should carry with it more information (or uncertainty), than the NS version, consequently facilitating more attempts at cue-attendance. College freshmen (N-160) were randomly assigned to one film version and one set of task requirements. From the obtained responses, average response uncertainty, maximum uncertainty in the message, relative uncertainty and redundancy were computed* (Attneave, 1959) for each version-task condition. The two tasks (CA and HG) and the two versions of the film (S and NS) provide a 2X2 table in which the measures were obtained. The results are shown in Table No. 1.

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* Uncertainty = $H = \sum p \text{Log} \frac{1}{p}$, Maximum Uncertainty = H_m = Log m, where m= number of observed alternatives when all are equiprobable; relative entropy = $R = \frac{H}{H_m}$, and redundancy = C = 1-R.

TABLE 1

Average Uncertainty and Related Measures Obtained From S's Responses to Each Set of Task-film Versions

Film I

Version of Film

Task	S	NS
CA	H = 5.13 H_m = 8.78 R_m = .584 C = .416	H = 4.53 H_m = 9.38 R_m = .483 C = .517
HG	H = 2.43 H_m = 5.614 R_m = .433 C = .567	H = 3.50 H_m = 5.644 R_m = .620 C = .380

Film II

Version of Film

Task	S	NS
CA	H = 5.58 H_m = 7.01 R = .6188 C = .38	H = 5.19 H_m = 8.99 R = .577 C = .423
HG	H = 3.3 H_m = 5.672 R = .582 C = .418	H = 4.86 H_m = 4.90 R = .992 C = .008

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Insert Table 1 about here

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A clear interaction emerges: the NS version carries the same amount of potential maximum response uncertainty as the S version, under the HG task-requirements, but practically, evokes more response uncertainty than the S version, and is therefore less redundant. The opposite occurs under the CA task-requirements. There, the NS version has higher maximum response uncertainty, but actually arouses less. Thus, under this task-requirement it is more redundant.

By specifying one of the attributes of film structure in information-theory terms, we are able to predict for which kinds of tasks each version will be most facilitating. Without such specification, our ability to predict the results of the experiment would be distinctly limited.

Summary and Conclusion

The present paper began with a brief discussion of a basic methodological premise, namely, that one ought to pursue interactions rather than main effects. We turned from there to a discussion of film-attributes claiming that the functional attributes of the medium are actually a subset of the structural ones, the difference lying in the expectations assigned to the former with regard to effects on the viewer. Those attributes which are expected to arouse certain effects are the functional ones. It was also suggested that attributes should be described first in structural terms and then "translated" into functional ones. The latter specify the nature of the attributes in terms which link them to expected psychological processes.

Both approaches--psycholinguistic and information-theory--can specify the functional nature of attributes only with respect to film purposes. In neither case can attributes be described without reference to particular tasks to be performed, or to the context in which they appear.

The two approaches suggested have an important common core: they both begin with the stimulus-material and seek a description of its effects on persons exposed. Since each approach is based on a substantial body

of research, one might use either or both for the purpose of specifying film-attributes. There is, however, one major difference between them. The psycholinguistic approach must assume the existence of some common language structure shared by different films. The information theory approach does not need such an assumption. The psycholinguistic approach is logical in nature and deals mainly with the kinds of information involved. The information-theory approach is empirical in nature and addresses itself mainly to the quantity of information presented.

Since the two orientations represent different bodies of observations and because they address themselves to different aspects of film, it may seem most reasonable to combine the two for a more powerful description of film attributes.

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800 ABSTRACT

A procedure by which structural film-attributes can be specified in technical terms was suggested. Its purpose was to study interactions between learner, and material and tasks in order to understand why certain media attributes affect learning. Treatment of film attributes begins with an ecological survey and shifts to description of their functional rather than their structural nature. Psycholinguistics and information-theory were proposed as two possible fields of study which can be used for this purpose either separately on in combination. Examples and empirical evidence were given to illustrate the nature of the suggested approach.

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